HORNED LIZARD CONSERVATION SOCIETY
Post Office Box 122, Austin, Texas 78767

Phrynosomatics

The Newsletter of the Horned Lizard Conservation Society

Our purpose is to document and publicize the values and conservation needs of horned lizards, to promote horned lizard conservation projects, and to assist with horned lizard management initiatives throughout their ranges.

Volume 27, Issue No. 3 **August 2022**

Thermal and Vegetation Microhabitat Preferences of Texas Horned Lizards in Mason County, Texas

2020 Grant recipient summary

By Patrick Ryan, Padraic Elliott, and Dean Williams

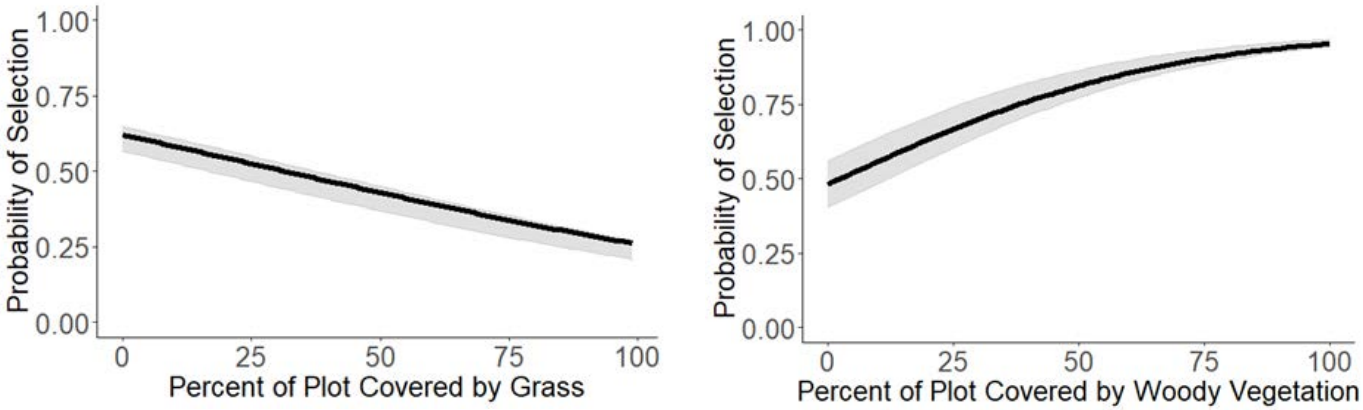

Fig. 1. Association between the probability of microhabitat selection by Texas horned lizards in Mason County TX. and the percentage of the sampling plot covered by grass and woody vegetation. The grey area represents the 95% confidence area.

IWe compared microhabitat use, thermal environments, home range size, and distance travelled by Texas horned lizards that were reintroduced at Mason Mountain WMA (MM) and lizards that occurred naturally at the White Ranch (WR) (~ 28 km from MM). We asked if reintroduced lizards at Mason Mountain WMA utilized their habitat in a similar way to lizards at the White Ranch, and how the overall habitat varied between the sites.

We radio-tracked 18 lizards from June 1, 2021 – July 20, 2021 (n = 4 at MM and n = 14 at WR). Lizards were relocated in three time periods (morning 7:00-11:00; afternoon 11:00-16:00; evening 16:00 – 20:00) and we tried to relocate each individual lizard equally between these time periods. When a lizard was relocated, we collected habitat data (percent coverage of grass, forbs, open soil, woody vegetation, and soil compaction) and temperature data from a 1x1-meter plot centered on the lizard and a randomly selected plot located 10 meters away from the lizard.

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We used binomial, general linear mixed models to ask if lizards were found in plots that differed in their habitat characteristics from the random plots and to control for the fact that individual lizards were sampled multiple times. Lizard cloacal and body surface temperatures were collected across different microhabitats and times of day. Temperature loggers (12 at each site, within horned lizard home ranges) were also placed in three microhabitats (open, covered - under shrubs, and buried ~2cm under the soil) to measure environmental temperatures every ten minutes for the duration of this study.

Across both sites, lizards were more likely to be found in plots with less grass and more woody vegetation than random plots (Fig. 1). During the morning period, lizards were found in plots with more open soil and in the evening, they were found in plots with more woody vegetation (Figs 2 and 3). When analyzing each site separately, lizards chose sites with more woody vegetation at MM (Fig. 4) and more fallen ground litter (leaves and fallen branches), more woody vegetation, and less grass at WR (Fig. 5). When we compared the availability of microhabitats between sites (using only our randomly selected plots), we found that there were more open areas with bare soil at WR and there were more forbs and overall vegetation cover at MM (Fig. 6).

Average home range size (95% MCPs for lizards with 10 or more relocations) for reintroduced lizards at MM did not differ from the home range size of native lizards at the White Ranch (1.34 ± 0.98 ha for four lizards at MM, and 1.20 ± 0.71 ha for six lizards at WR). The average daily distance traveled by MM lizards did not differ from the distances traveled by WR lizards (29.23 ± 36.27 m at MM vs. 35.66 ± 38.47 m at WR). Home range and daily distance traveled for lizards at the MM were also similar to a study of translocated adults at MM in 2014 (Fink 2017). The mean number of harvester ant mounds/ha for each Texas horned lizard home range did not differ between sites (9.04 ± 1.86 mounds at MM vs. 8.35 ± 7.50 at WR).

Lizard temperatures and the ground temperatures they selected at different times of day were similar between MM and WR. The temperatures of the three microhabitats (open, covered, buried) the lizards were found in while radio tracking did not differ by site. Only the covered habitat that lizards were found in were more often within their preferred temperature range than at or above their critical temperature (Fig. 7). Temperature loggers also indicated that covered microhabitat was more often within their preferred temperature range than at or above their critical temperature (Fig. 8).

The three microhabitats with temperature loggers also did not differ between MM and WR except for the covered microhabitat in the afternoon period. Cover stayed within the lizard's optimal temperature range at the WR while covered habitat at MM had higher than optimal temperatures during the afternoon hours (Fig. 9).

Open microhabitats were preferred in the morning when lizards needed to warm up, but by the afternoon both open and buried microhabitats exceeded their critical temperature. Covered microhabitats had higher thermal quality especially in the afternoon hours (measured as the degree to which environmental temperature deviates from the lizard's optimal temperature range) than either the open or buried microhabitats, and horned lizards at both sites were more likely to be found in plots with more woody vegetation. Plots with woody vegetation were especially preferred in the evening hours.

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Lizards at MM and WR appear to utilize their habitats in a similar fashion. Mason Mountain WMA and WR do differ from each other in a few ways that might be important for horned lizards at MM, especially as their numbers increase and they disperse further.

Mason Mountain WMA had more forb cover and overall vegetative cover compared to WR which had more open bare soil. At MM, lizards moved away from the release site into areas with more embedded rock and thicker rhizomatous grass cover. Anecdotally, lizards appeared to have difficulty moving through this thick grass at MM.

Given that lizards overall selected plots with less grass and they selected more open areas in the morning, it may be beneficial to implement more prescribed burns at the release site and the areas surrounding this area at Mason Mountain WMA on a more frequent basis. Burning would reduce the thick patches of grass that can inhibit horned lizard movement as well as trigger reproductive processes in many plant species that attract harvester ants.

Future studies should measure the spatial configuration of microhabitats at MM and WR since previous studies with lizards have shown that clumped distributions are better than more even distributions since it allows lizards to move between microhabitats more quickly. It is also not clear why vegetative cover at MM did not depress afternoon temperatures as much as vegetation at WR since at both sites the temperature probes were placed under woody vegetation. It is also not clear if temperatures above their preferred temperature range at MM would negatively affect horned lizards over the long-term or if they can mitigate this by for instance, climbing up into the shrubs (which was observed on a few occasions). More studies of vegetative cover at MM should be conducted to determine if shrub species composition and structure are different from WR, how their thermal quality varies, and how it compares to the thermal quality of thick grass cover.

Figures:

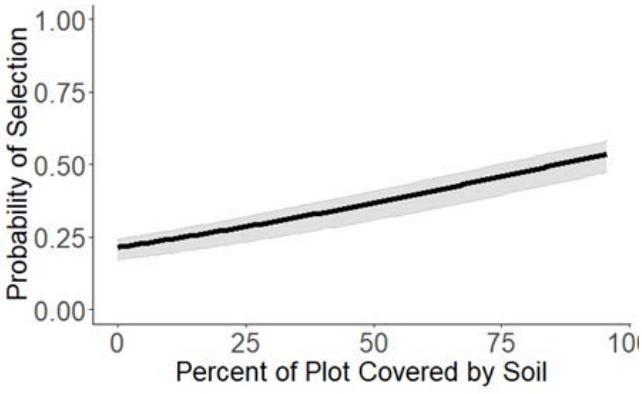

Fig. 2. Association between the probability of microhabitat selection by Texas horned lizards in Mason County TX during the morning and the percentage of the sampling plot covered by bare soil. The grey area represents the 95% confidence area.

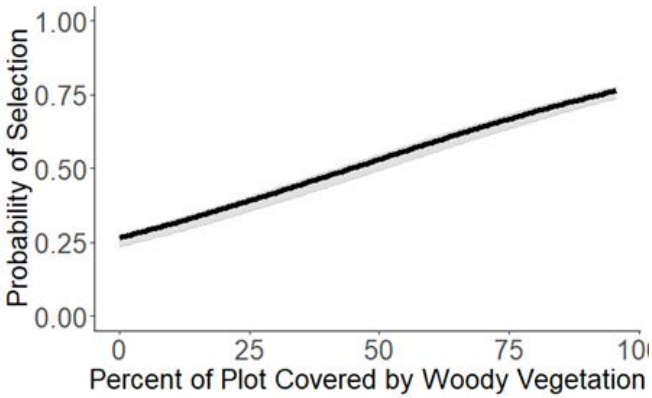

Fig. 3. Association between the probability of microhabitat selection by Texas horned lizards in Mason County TX during the evening and the percentage of the sampling plot covered by woody vegetation. The grey area represents the 95% confidence area.

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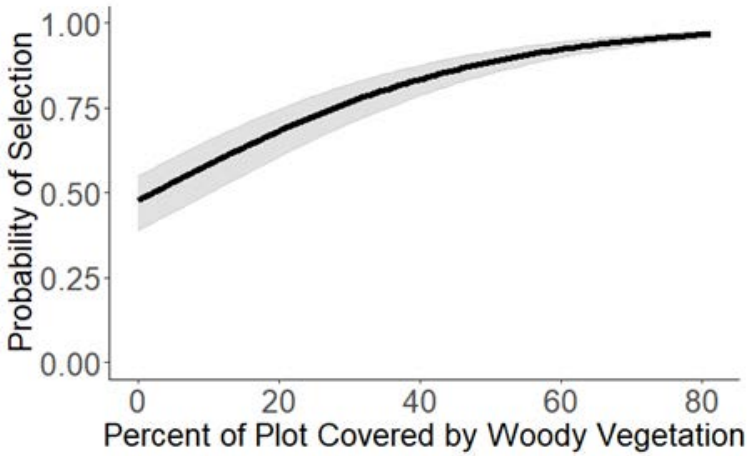

Fig. 4. Association between the probability of microhabitat selection of Texas horned lizards and the percentage of the sampling plot covered by woody vegetation by lizards at MMWMA. The grey area represents the 95% confidence area.

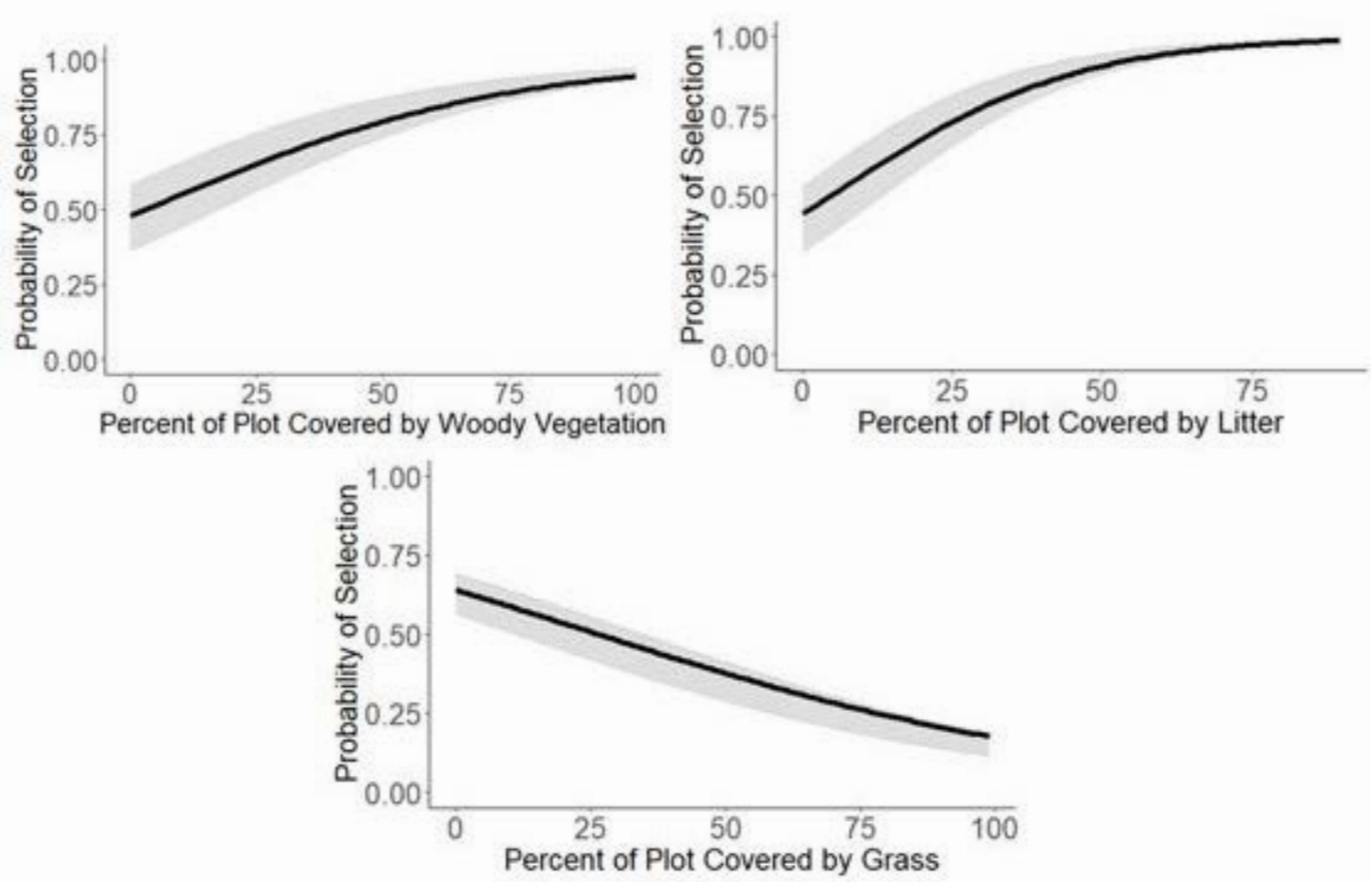

Fig. 5. Association between the probability of microhabitat selection by Texas horned lizards and the percentage of the sampling plot covered by woody vegetation, litter, and grass by lizards at WR. The grey area represents the 95% confidence area.

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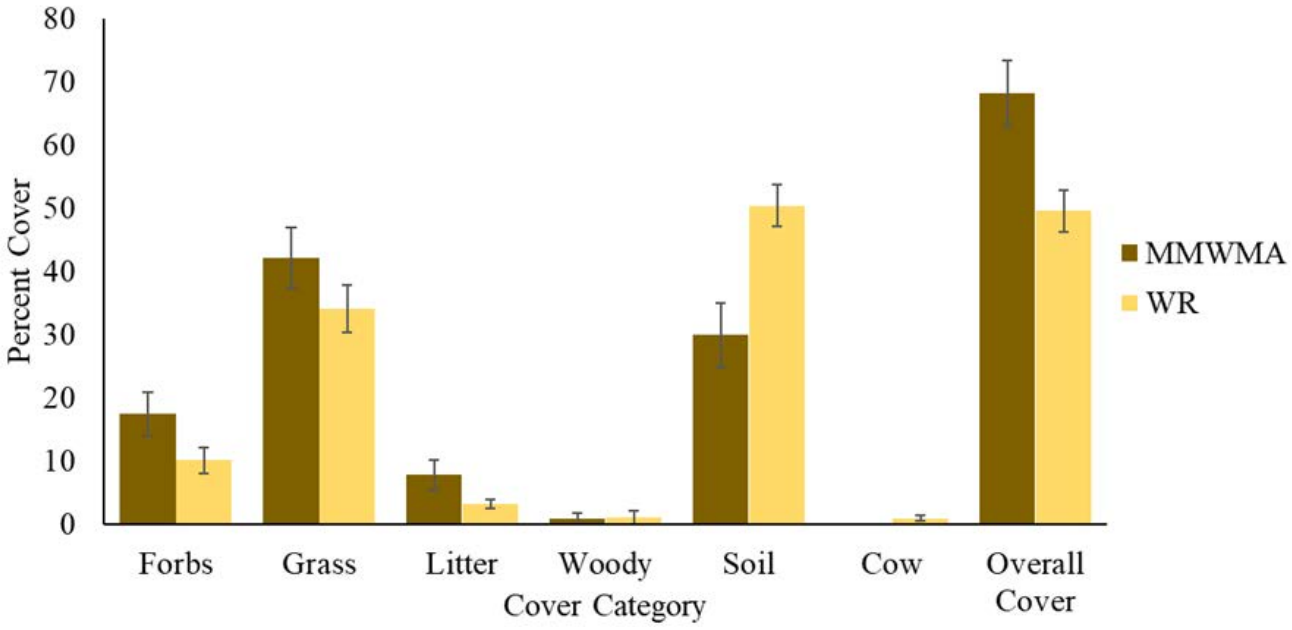

Fig 6. Average percentages (± 2SE) of forbs, grass, litter, woody vegetation, soil, cow droppings and overall vegetation cover at Mason Mountain WMA (MMWMA, 102 plots) and the White Ranch (WR, 201 plots) during the summer of 2021.

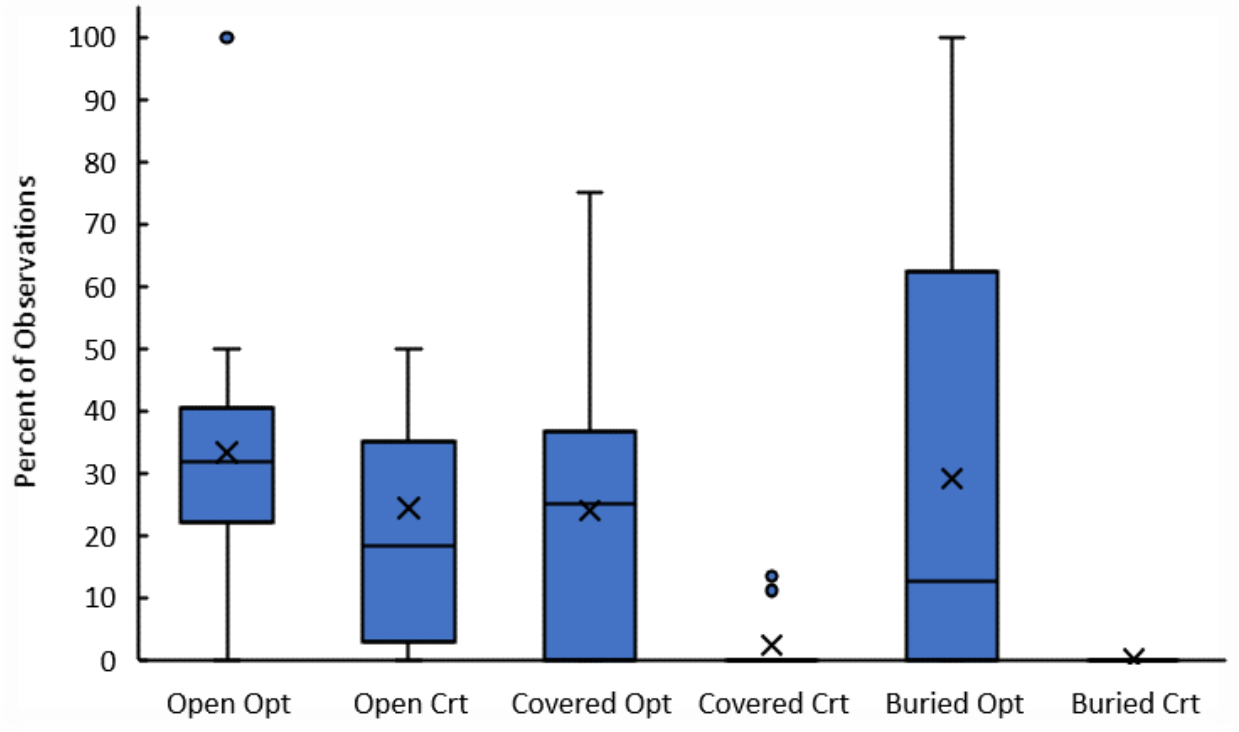

Fig. 7. Boxplots of percent of time microhabitats lizards were found in were in the optimal or critical temperature range. Optimal and Critical are referred to as 'Opt' and 'Crt'.

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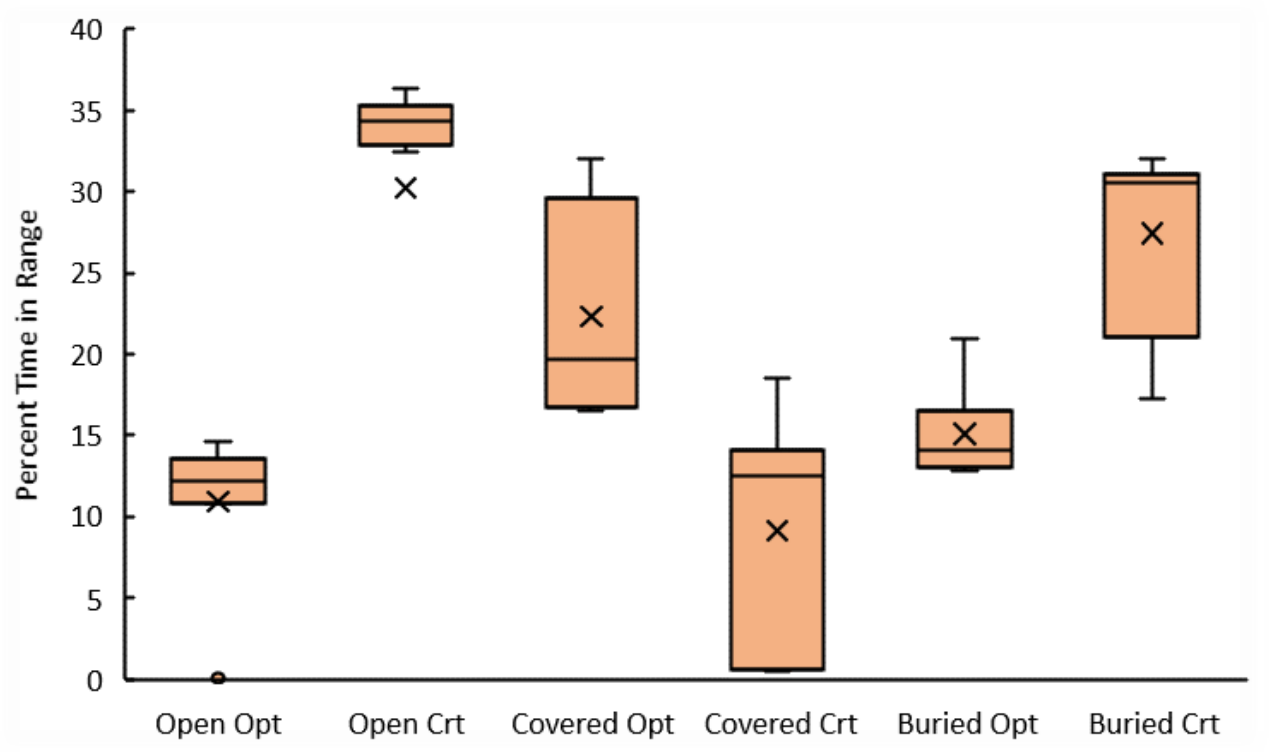

Fig. 8. Boxplots for percent of time models in different microhabitats were in the optimal or critical temperature range. Optimal and Critical are referred to as 'Opt' and 'Crt'.

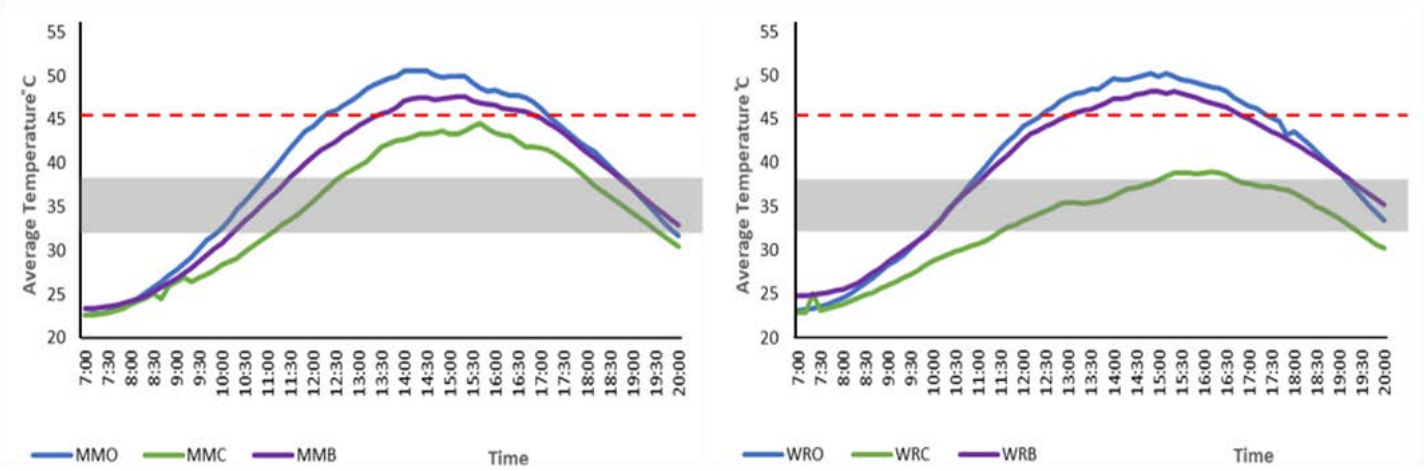

Fig. 9. Average temperature from data loggers in different microhabitats across different times of the day. A) Average temperatures over time at MM. B) Average temperatures over time at WR. Open microhabitats are MMO and WRO, covered microhabitats are MMC and WRC, and buried microhabitats are MMB and WRB. The red line represents the lower end of the critical temperature range and the grey box represents the optimal temperature range.

Horned Lizard Detection Canine Scat Collection Kits

2020 Grant Recipient Summary

By Paul Bunker

Nika the Texas Horned Lizard Detection Canine during a survey

Chiron K9 received a grant from the Horned Lizard Conservation Society to assist in the development of a Texas Horned Lizard Detection Canine team capability. The canine teams would support the Horned Lizard Reintroduction project at the Center for Conservation and Research at San Antonio Zoo. The aims of the canine team in integrating with the current survey strategy are to:

- Survey potential release sites
- Continuous monitoring of released lizards
- Assistance with the collection of lizards for breed stock rotation

The first phase in training the canines is to ensure they can detect and indicate the presence of scat. This is an easier sample type to procure and handle and is in plentiful supply. After the canine has been trained on scat, other scents, such as lizards or shed skin, can be added to the canine's scent memory.

The canine's training involves building an association between the smell of horned lizard scat and a reward. This is achieved through positive reinforcement by associating the behavior of alerting to the smell of the horned lizard scat and the canine receiving treats or playing with a toy. A training tool known as a "clicker" is used to aid this process. This small plastic box has a metal strip inside of it which, when depressed, makes a click sound. Once associated in the canine's mind with a reward, this sound is used to signal to the canine when the behavior it is conducting is correct.

The training process means we must have scat to train the canine and build the association with the smell. San Antonio Zoo provides ample scat from the captive colony, but the limitation is that we may train the dog to locate only the smell of the captive-bred lizards and not those found in the wild. This

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is because a canine's nose is so sensitive that it can distinguish the difference between captive lizard scat and wild specimens. Things such as diet, environment, and ground conditions, can all influence the smell of the scat to such a degree the canine can tell the difference. Therefore, to enable us to train the canine to detect all specimens of horned lizard scat, we must have a variety of samples collected from different locations. This provides sufficient variation in the scat samples that the canine will generalize the odor scent and be able to detect any specimen of horned lizard scat.

Generalization is the ability of a canine to detect and alert on a target (in this case, horned lizard scat) that is similar to what the canine has smelled previously but not the exact same. This capability is essential for conservation canines and is something we, the trainers and handlers, must be actively promoting to ensure field efficiency.

To support the requirement to generalize the canine's nose, the Horned Lizard Conservation Society provided a grant to develop scat collection kits. These kits provide everything needed to collect field scat and mail it for use in the canine's training. The kit consists of; tweezers, disposable gloves, small collection vials, a collection spoon, and Ziplock bags. It is essential that no contamination scents are introduced to the scat samples. If someone were to handle the samples, or they were placed next to a strong odor, this would become part of the scent picture in the canine's mind and reduce field capability. Therefore, the scat collection kit is designed to allow for the collection of samples while preventing any cross-contamination of scents.

Jar of Texas Horned Lizard Scat

A Collection Kit

Initially, a team was selected for a proof-of-concept trial; Mason Lee and Ranger were the first volunteers; however, Mason moved to Wyoming before the end of the training, and so a new team was selected; Chris Bagley and Gren. Gren was trained to detect horned lizard scat while surveying areas off-leash under the direction of Chris. On 24 October 2019, a proof-of-concept survey was conducted on a ranch near Jourdanton in which Gren detected and alerted to the presence of horned lizard scat. This confirmed the ability of the canine to detect the scat and support the reintroduction project.

The original plan was to introduce the scat collection kits at the Horned Lizard Conservation Conference, but the pandemic caused the conference to be canceled. It is hoped a future conference will allow for the distribution of the kits.

A video was also produced detailing the collection protocols, including a data form. This can be seen at: https://chiron-k9.com/horned-lizard-scat-collection

Become a Horned Lizard Conservation Leader!

HLCS is currently seeking nominations for a 2-year term for the 2023-2024 Board of Directors.

The following positions will be available: President-Elect, Secretary, Treasurer, Member Services, and Director-at-Large. Members who are interested can nominate themselves – if you nominate someone else please get their permission before nominating them.

Please provide a brief (up to 7 sentences) biography describing any interest/expertise in leadership and/or horned lizard conservation efforts. No prior experience is required. Board members are expected to be available for correspondence via e-mail, occasional conference calls or in-person meetings. In addition to the specific duties mentioned above, board members are expected to participate in at least two board meetings per year. HLCS can opt to provide travel funds to board members to attend meetings.

This slate of officers should take office in January 2023 and will serve for two years. The President-Elect then shall hold the office of president for two additional years.

Feel free to contact the current officer or the President Mason Lee if you have any questions. Nominations/volunteers must be received by September 30, 2022.

Please submit nominations (with biographies) to President Mason Lee at masonmlee3@gmail.com

President-elect - The President-Elect shall serve in the absence of the President or in the event or the incapacity or resignation of the President, and when so acting, shall have all the powers of and be subject to all the restrictions upon the President. The President-Elect shall plan and recruit committees and plan and execute the biennial national meeting. The President-Elect becomes the President at the end of a two-year term.

Secretary - The Secretary shall be responsible for Corporate records, keep the minutes of all general membership and BOD meetings, and in general perform all duties incident to the office of Secretary and such other duties as from time to time may be assigned by the President or the BOD. The Secretary shall also be responsible for cataloguing and maintaining the supply of all publications of the Corporation and responding to requests for information from the membership and general public.

Treasurer - The Treasurer shall be responsible for all funds and securities of the Corporation; receive and give receipts for moneys due and payable to the Corporation from any source; and deposit all such moneys in the name of the Corporation in such banks, trust companies, or other depositories as shall be elected by the BOD. The Treasurer shall advise the BOD in preparation of an annual budget, be responsible for all financial records, and provide the BOD and the membership with written financial reports, including an annual report, sit on the Fund-Raising Committee, and in general perform all duties incident to the office of Treasurer and such other duties as from time to time may be assigned by the President or the Board of Directors.

Director-at-large - The Director-at-Large shall be responsible for development of special projects as assigned by the Board, particularly related to integration of scientific knowledge and conservation issues – this position has been filled by a professional biologist/ecologist in the past. Whenever possible, nominees for this position should be drawn from states not otherwise represented on the BOD.

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HLCS 2023 Grant Program

The Horned Lizard Conservation Society is dedicated to protecting horned lizards by documenting and publicizing the values and conservation needs of horned lizards, promoting horned lizard conservation projects, and assisting with horned lizard management initiatives. Towards those ends, the HLCS annually sponsors research that has direct conservation applications. To learn more about the society and past grants, go to http://www.hornedlizards.org/.

HLCS will be offering grants again in 2023. In the past, priority has been given to projects that have direct conservation implications, including public education.

To apply, send a proposal detailing the goal of the study, the rationale for it including relevance to conservation of horned lizards, and how your work would benefit from this opportunity. The proposal may not exceed 1000 words. Also include a preliminary budget with as much detail as possible and with any other funding sources available, received for your project, and other grants you are applying
for. Word format documents are preferred. In addition, send a short resume or CV (up to 3 pages) for the lead applicant and have a single letter of reference sent to Miranda Vesy: miranda.vesy@gmail.com. All three documents should be in separate digital files. Check the website for more information. The deadline is January 15, 2023. The decision will be announced by March 1, 2023.

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